Discussion

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It seems that whenever Robert Gordon decides to take a romp through the data, our profession learns something of importance. The paper he has prepared for this Conference is no exception. He focuses on the well-documented slowdown in productivity growth in the mid 1970s and demonstrates that it was concentrated in sectors of the economy that are intrinsically hard to measure. The fact that these same sectors have been increasing in relative importance over time is suggestive of an important role for measurement issues in the perceived productivity slowdown. In addition, he offers two economic hypotheses: first, in some sectors there has been a degree of technological depletion, as he calls it; and second, the gradual weakening of the market power of US labour may have led to disproportionate growth of low-paying, overstaffed, low-productivity jobs in that economy.

The core of the paper deals with issues of price measurement. I do not need to remind this audience of Gordon's reputation on this topic. He has invested many years in it, and the contrast with my own level of expertise on the subject could not be more stark. I was accordingly very relieved to discover that my role as discussant would be not to critique this work specifically, but rather to draw out of it the issues I believe are worthy of further discussion.

There are, of course, several sides to every economic debate. Some will no doubt wish to argue that other economic or structural factors played a dominant role in the productivity slowdown. The digestion of the energy price shocks that took place in the 1970s is a prominent example. Others have suggested that the slowdown might be more appropriately characterised as a return to normal, after an extraordinary productivity pickup earlier on, related to the post-war period of rapid technological advance. Some will probably question Gordon's suggestion that reduced market power of labour led to lower productivity growth, simply on the grounds that more flexibility in markets is almost always associated with better economic outcomes. And, with regard to Gordon's sectoral analysis one could ask, just to cite a couple of examples, about the role of the regulatory environment in the case of utilities, or of the handling of seat-discounts in the data on air transportation, in generating his results.

Nevertheless, many of the available economic and measurement explanations probably contain some validity, as they are all correlated with the productivity slowdown. We are basically faced with a classic identification problem. Most of the variables that we have in our theory of economic growth are themselves endogenous, with the implication that one can obtain almost any empirical result just by altering the identifying assumptions that one imposes on the data.

Most of the usual economic explanations for the productivity slowdown can be described as 'real' or 'structural' in nature. But when I look at the broad stylised facts of the past 25 years, the shock that stands out for me is a nominal one. I have in mind, of course, the rise in inflation that began in the late 1960s. Perhaps this view of the world is a product of my training, or of the time I have spent as a central banker. In any case,

this represents for me the largest and most significant exogenous disturbance in modern economic history.

Inflation in the United States was at levels that many would describe as negligible in the first half of the 1960s, and it went through a series of cycles along a rising trend until 1980, at which time the pattern was broken. Inflation then spent most of the 1980s in the 4-6 per cent range, again showing a slight tendency to rise, until 1991, when we appear to have experienced a downward ratcheting. But it would be fair to say that, even now, we have not yet worked off completely the effects of the surge in inflation that began some 30 years ago.

We know the origins of this shock. Excessive US monetary expansion in the late 1960s was transmitted via a fixed exchange rate system throughout the major world economies. The final outcomes were not identical in every major country, of course, because the fixed exchange rate system was one of the casualties of this shock, enabling policy responses to differ from country to country later in the 1970s.

The decline in the purchasing power of US dollars during 1965-72 was surely a factor that contributed to efforts on the part of major petroleum producers to raise their prices in the 1970s. The two oil price shocks that resulted of course represented *relative* price changes, albeit large ones, but given that general inflationary pressures were already widespread, they had more the effect of adding to those pressures at the time.

The hypothesis that I would like to advance today is an encompassing one. Thinking of the various factors that might have caused the productivity slowdown – be they structural or measurement in nature – as *competing* hypotheses seems to me to miss the point entirely. I suspect that many of these potential explanations might be related to one another, not for causal reasons, but because they represent multiple symptoms of a common exogenous disturbance, namely, the rise in inflation that, in fact, has yet to be fully reversed.

Now, I will not go into an extensive review of the literature on the link between inflation and real output, for it is well known to this audience. Suffice to say that most economists seem to believe that there are real economic costs associated with ongoing inflation; in short, they believe that non-superneutralities exist. They have in mind the resources spent managing money holdings and changing prices frequently. They have in mind interactions between inflation and distortionary features of the taxation system, such as the taxation of nominal interest income and rules for inventory and depreciation expenses. They have in mind confusion in relative price signals. And they have in mind the uncertainty that arises from the positive association between the level of inflation and its volatility. The problem, of course, is that these effects are very difficult to quantify. Many have tried, and few have succeeded, in demonstrating a statistically robust causal link between inflation and GDP or productivity growth.

Levine and Zervos (1993) have summarised quite well the weaknesses contained in cross-country regressions of real growth on inflation. Nevertheless, if one's priors are that the link exists, it is difficult to disregard research such as that reported in Cozier and Selody (1992), Motley (1994) and, of course, Barro (1995). There is some debate as to whether inflation affects the level of output, or its growth rate. But, since any effects on the level are sure to be spread over time, the two cases would be difficult to distinguish

in practice. The latest estimates from this literature suggest that non-superneutralities are not large but, in a growth context in particular, they do not need to be large to be important.

In any case, it is likely to be very difficult to measure the size of such non-superneutralities using the macro data. For one thing, it can be expected that inflation will distort the labour-leisure decision, making GDP a particularly poor measure with which to compare economic welfare between low-inflation and high-inflation regimes. Second, government tax structures are likely to be endogenous to changes in inflation, as governments attempt to provide the same services in all inflation regimes. Thus, if tax revenue falls as inflation falls, governments are likely to increase the rates of taxation when inflation declines, thereby increasing the size of the tax distortions and offsetting some of the real benefits associated with the distortion-reducing drop in inflation. And third, the effects of inflation on real activity might simply be very small; although early work with endogenous growth models with tax distortions (Black, Macklem and Poloz 1994) suggests that the economic costs of inflation might eventually be very large, the predicted effects on the *growth rate* of output appear to be small enough to be difficult to detect using standard empirical methods.

Let us set this empirical debate aside, then, and proceed on the presumption that non-superneutralities are economically important, and therefore that the rise in inflation was at least a factor that contributed to the productivity slowdown. Where does this put Gordon's very convincing evidence on productivity measurement? I believe that this finding, too, can be at least partly encompassed by the hypothesis that the rise in inflation was the root cause. This is because much of Gordon's hypothesis rests on problems of price measurement. For example, it is well known that the degree of substitution bias in price indices will be greater during periods when relative prices are changing significantly which, as already noted, was certainly a feature of the 1970s (see Crawford (1993) for a discussion). In any case, there is certainly room for both the measurement error and the inflation/productivity hypotheses, and perhaps others, in explaining the productivity slowdown. I am only suggesting that the role of inflation in all this is deserving of some serious attention.

All of this matters a good deal right now, of course. For if you believe that the productivity slowdown was due to the declining market power of labour, or technological depletion, or simply a function of the difficulties of measurement, then you are unlikely to be looking for a productivity acceleration now. However, if you put any weight on the hypothesis that the slowdown was related to the rise in inflation, then you will be looking for evidence of a productivity acceleration as we move through the 1990s, particularly in countries where inflation is settling in at negligible levels.

I do not want to give you the impression that I believe that everything, and not simply inflation, is always and everywhere a monetary phenomenon. However, I suspect that inflation may have played an important role in the events that this paper is attempting to explain. A major deceleration in inflation has now occurred in many countries, so it seems that perhaps all we have to do is to await the outcome of this new experiment. In the meantime, I found Gordon's analysis of measurement issues to be very enlightening, and can only hope that statistical agencies will take it seriously.

References

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2. General Discussion

Discussion was centred on three main issues:

- the distinction between actual and measured productivity performance;
- the possible sources of poor service-sector productivity; and
- the implications of poor productivity performance for employment.

The importance of these issues was reinforced by the observation that an increasing share of activity is occurring in those areas of the economy that are inherently difficult to measure. But measurement issues are not confined to specific sectors. Those that relate to the estimation of computer volumes affect the capital stock and, thereby, the measurement of productivity in a range of industries. Furthermore, even in those areas where productivity can be measured more accurately, it was argued that failure to take account of the role of intermediate inputs might give a misleading indication of productivity. For example, measurement of multi-factor productivity using only labour and capital implies that there has been significantly higher productivity growth in US manufacturing than in other sectors of the economy. However, it was argued that models which also employ energy and materials generate estimates of multi-factor productivity growth that are about half that of the standard two-factor model.

A number of possible sources of the productivity slowdown in the US were proposed. Much attention was paid to the role of computers, not just in terms of the measurement problems that they introduce, but in terms of the way in which they are used. It was noted that computers are a 'general purpose' technology in which a lot of resources are invested. When first used, they may cause a negative productivity shock. Since users cannot readily measure computational power, computers tend to be employed inefficiently. An analogous example was said to be electricity: initially, it did not have an 'on/off' switch, so its use was not economised and the productivity benefits were not realised for

many years. Similarly, it was argued that we are yet to witness the productivity benefits of the computer revolution. In opposition to this view, though, it was noted that the potential productivity benefits of computers may be squandered as computers become progressively cheaper and are put to less productive uses.

The role of inflation in the productivity slowdown was also debated. One hypothesis was that the inflationary surge that began 30 years ago was the largest exogenous shock to output growth and productivity of modern times. Supporters of this view argued that the present environment of low inflation should be the catalyst for an acceleration in productivity that commences now. Others queried why inflation should cause such pronounced sectoral differences in productivity performance. One possibility was said to be the different responses of countries to inflation and the way this impacted on real exchange rates. For example, for much of the 1960s and the first half of the 1980s, the US dollar was overvalued and encouraged expansion of the non-traded goods sector.

The most pressing concern, however, was the implication of the productivity slowdown for employment. Wage dispersion in the US was said to be associated with high employment growth at the low and the high end of the income distribution, with a hollowing out of middle-income jobs that have traditionally been unionised. The increased proportion of wages in the bottom half of the income distribution has encouraged excessive labour use in specific sectors, resulting in low productivity. Consequently, a pessimistic message was that in order to achieve greater productivity, one has to rationalise inputs and lose jobs. And yet, there have been great inventions in contemporary history. Why is the choice not better than it is? What can be done so that countries can have more productivity *and* more jobs? Here it was argued that one has to address a fundamental problem – the depletion of ideas.